

means for heating the PCR sample at a rate of at least 0.5°C/second;
means for cooling the PCR sample at a rate of at least 0.5°C/second;
control means for repeatedly operating the means for heating and the means for
cooling to subject the PCR sample to thermal cycling;
means for optically exciting the to cause the sample to fluoresce; and
means for detecting the fluorescence of the excited sample during amplification
when the sample is in the monitoring position.

33. (Twice Amended) A system for performing PCR and monitoring the
reaction in real time during temperature cycling comprising:

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a plurality of sample containers for holding a plurality of PCR samples, each
sample container comprising an optically clear capillary tube, each sample container formed for
holding less than 1 milliliter of a sample and having a sealed end and an open end with a sealable
closure on the open end;

means for holding a plurality of sample containers, the means for holding
comprising a rotatable carousel formed for holding the sample containers;

means for forcing hot gas into contact with the plurality of sample containers;

means for forcing cool gas into contact with the plurality of sample containers;

means for repeatedly operating the means for forcing hot gas and the means for
forcing cool gas to subject the PCR samples to thermal cycling;

means for optically exciting at least one selected PCR sample to cause the selected
PCR sample to fluoresce;

means for detecting the fluorescence of the excited selected PCR sample at both a
first wavelength and a second wavelength; and

means for determining at least one reaction parameter for the selected PCR sample in accordance with the fluorescence at the first and second wavelengths and displaying the reaction parameter in a visually perceptible manner in real time.

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4 55. (Twice Amended) A system for carrying out and monitoring the progress of first and second biological reactions comprising:

first holding means for holding a first biological sample;

second holding means for holding a second biological sample;

transporting means for moving the first and second holding means between a non-monitoring position and a monitoring position;

thermal cycling means for repeatedly heating and cooling the first holding means and the second holding means in both the non-monitoring position and in the monitoring position to carry out thermal cycling on both the first biological sample and the second biological sample, the thermal cycling means comprising a means for heating selected from the group consisting of hot gas, a lamp, and infrared radiation and a means for cooling comprising cool air flow;

monitoring means for ascertaining the progress of the first biological reaction in the first means for holding and the second biological reaction in the second means for holding when the first and second biological samples are in the monitoring position, the means for monitoring comprising means for detecting radiation emitted from the first and second biological samples; and

controlling means for controlling the operation of the transporting means, thermal cycling means, and the monitoring means such that the progress of the first and second biological reactions is detected as thermal cycling occurs.

128. (Twice Amended) A system for performing PCR and monitoring the reaction during temperature cycling comprising;

 a sample container for holding a PCR sample, the sample container comprising an optically clear material, the sample container formed for holding less than 1 milliliter of a sample and having a first side, a second side, and an end;

 means for positioning the PCR sample container in a monitoring position;

 means for heating the PCR sample at a rate of at least 0.5°C/second;

 means for cooling the PCR sample at a rate of at least 0.5°C/second;

 control means for repeatedly operating the means for heating and the means for cooling to subject the PCR sample to thermal cycling;

 means for optically exciting the sample to cause the sample to fluoresce;

 means for detecting the fluorescence of the excited sample during amplification when the sample container is in the monitoring position;

 means for determining at least one reaction parameter in accordance with the detected fluorescence; and

 means for adjusting the control means in accordance with the reaction parameter.

145. (Amended) A system for performing PCR and monitoring the reaction in real time during temperature cycling comprising;

 a plurality of sample containers for holding a plurality of PCR samples, each sample container comprising an optically clear capillary tube, each sample container formed for holding less than 1 milliliter of a sample and having a sealed end and an open end with a sealable closure on the open end;

 means for holding a plurality of sample containers, the means for holding comprising a rotatable carousel formed for holding the sample containers;

means for forcing hot gas into contact with the plurality of sample containers;

means for forcing cool gas into contact with the plurality of sample containers;

means for repeatedly operating the means for forcing hot gas and the means for forcing gas fluid to subject the PCR samples to thermal cycling;

means for optically exciting at least one selected PCR sample to cause the selected PCR sample to fluoresce;

means for detecting the fluorescence of the excited selected PCR sample at both a first wavelength and a second wavelength;

means for determining at least one reaction parameter for the selected PCR sample in accordance with the detected fluorescence at the first and second wavelengths and displaying the reaction parameter in a visually perceptible manner in real time; and

means for adjusting the means for repeatedly operating in accordance with the reaction parameter such that the reaction is adjusted in real time.

Please add the following new claims:

159. (New) The system of claim 13 wherein the rate of heating the PCR sample and the rate of cooling the PCR sample is at least 1.0°C/second.

160. (New) The system of claim 13 wherein the rate of heating the PCR sample and the rate of cooling the PCR sample is at least 4.0°C/second.

161. (New) The system of claim 13 wherein the rate of heating the PCR sample and the rate of cooling the PCR sample is at least 10°C/second.

162. (New) The system of claim 13 wherein the rate of heating the PCR sample and the rate of cooling the PCR sample is at least 20°C/second.

163. (New) A system for performing PCR and monitoring the reaction during temperature cycling comprising;

a sample container for holding a PCR sample, the sample container comprising an optically clear material, the sample container formed for holding less than 1 milliliter of a sample and having a first side, a second side, and an end;

means for positioning the PCR sample container in a monitoring position;

means for heating the PCR sample, wherein the means for heating is selected from the group consisting of hot gas, a lamp, and infrared radiation;

means for cooling the PCR sample using cool air flow;

control means for repeatedly operating the means for heating and the means for cooling to subject the PCR sample to thermal cycling;

means for optically exciting the to cause the sample to fluoresce; and

means for detecting the fluorescence of the excited sample during amplification when the sample is in the monitoring position.

164. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 163 further comprising:

means for determining at least one reaction parameter in accordance with the detected fluorescence.

165. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 164 further comprising means for adjusting the control means in accordance with the reaction parameter.

166. (New) The system for performing PCR and monitoring the reaction in real time during temperature cycling as defined in claim 33 wherein the gas is air.

167. (New) The system for performing PCR and monitoring the reaction in real time during temperature cycling as defined in claim 145 wherein the gas is air.

168. (New) A system for carrying out and monitoring the progress of first and second biological reactions comprising:

first holding means for holding a first biological sample;
second holding means for holding a second biological sample;
transporting means for moving the first and second holding means between a non-monitoring position and a monitoring position;
thermal cycling means for repeatedly heating and cooling the first holding means and the second holding means in both the non-monitoring position and in the monitoring position to carry out thermal cycling on both the first biological sample and the second biological sample, wherein the thermal cycling means heats and cools the first holding means and the second holding means at a rate of at least 0.5°C/second;

monitoring means for ascertaining the progress of the first biological reaction in the first means for holding and the second biological reaction in the second means for holding when the first and second biological samples are in the monitoring position, the means for

monitoring comprising means for detecting radiation emitted from the first and second biological samples; and

controlling means for controlling the operation of the transporting means, thermal cycling means, and the monitoring means such that the progress of the first and second biological reactions is detected as thermal cycling occurs.

169. (New) The system for carrying out and monitoring the progress of first and second biological reactions as defined in claim 168 wherein the thermal cycling means heats and cools the first holding means and the second holding means at a rate of at least 1.0°C/second

170. (New) The system for carrying out and monitoring the progress of first and second biological reactions as defined in claim 168 wherein the thermal cycling means heats and cools the first holding means and the second holding means at a rate of at least 4.0°C/second

171. (New) The system for carrying out and monitoring the progress of first and second biological reactions as defined in claim 168 wherein the thermal cycling means heats and cools the first holding means and the second holding means at a rate of at least 10°C/second

172. (New) The system for carrying out and monitoring the progress of first and second biological reactions as defined in claim 168 wherein the thermal cycling means heats and cools the first holding means and the second holding means at a rate of at least 20°C/second